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Yews

Mineral Physics Machines

The field of mineral physics will benefit from an era of big physics machines that will produce intense beams of X rays, neutrons, and high-energy particles. The new super accelerators are being built as tools for high-energy physics experiments and for materials cience research

Mineral physics studies are among the most sophisticated to be conducted. High-intensity X rays will be used to solve complex crystal structures, to detail the steps of fast mineral phase changes, and to penetrate to the sample chambers of high-pressure cells. Neutron beams powerful enough to penetrate surface layers of the earth's crust will be used to probe for mineral deposits.

Notable among the machines of this forthcoming era are the new synchrotrons and the "Desertron," a device so large it requires large, wide-open spaces. The new machines have recently received strong votes of support by the Department of Energy panels and by Congressional Committees, but only after stirring considerable controversy [see Eas, January 3, 1984, p. 1, for a report on the controversy surrounding academic science

Evidently a lot is at stake for the United States in the world of high-energy particle studies. The superconducting Super Collider (SSC), or Desertron, has evolved at the expense of the Isabelle superconducting pro-ton-proton collider (officially, Colliding Beam Accelerator), which has been under construction at the Brookhaven National Laboratory since 1978 at a cost of over \$200 million. Isabelle, which had been plagued with design problems, is now considered obsolete even though it has not been completed. Isabelle would have had a ring diameter of 3.6 km (actually already constructed). The SSC may have a ring diameter on the order of 160 km.

An example of a newly proposed and politically controversial accelerator that will have mineral physics applications is the new winchrotron light source at the National Center for Advanced Materials (NCAM) at the Lawrence Berkelely Laboratory in California. The synchrotron as originally planned was to be built as a central part of a large, materials science research and development laboratory. Controversy has resulted from the suddenness with which the project and its funding were announced in early 1983. The entire cost was announced as \$84 million, to be spread over 5 years. No peer review or competitive structure was employed by the Office of Management and Budget, and broad criticism has been voiced. The result has been that the synchrotron has been detailed for separate consideration and review by a special panel put together by the Department of Energy from which the funds are to be derived.

The concept of having research laboratories located next to (actually attached to) a synchrotron light source has a lot to be said for it. The synchrotron X ray beams in such demand for diffraction, Huorescence, line fine structure, and other physical measurements of minerals and other materials are only available to an investigator for short periods requiring advance notice. One to three days of beam-time per year is about the maximum currently available. For protection from the intense radiation, all experiments and measurements must be done by remote control, and thus an investigator must be prepared to spend time simply setting up for dignment and other premeasurements. Location of materials laboratories in close proximity to a synchrotron is unusually advanta-geous.—PMB

CO₂ Pulses

Studies of the sources and the increases of carbon dioxide in the atmosphere have been both frustrating and alarming; frustrating because so little is known and alarming because the potential consequences could be so grave (Eas, November 15, 1983, p. 929). The nature of the complexities have recently been focused upon by studies of the carbon cycle at the earth's surface and its influence on the atmosphere. It turns out that most of the increases of atmospheric carbon dioxide are from two sources: (1) petroleum and coal use

and (2) the clearing of major forested lands. It is generally acknowledged that fossil fuel use has declined sharply during the past several years and that the deforestation of large. areas under development will end. A recent review of current thinking on the effects of

MEMBERS

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global deforestation by G. M. Woodwell and others stated that, "appropriate action taken now might reduce or eliminate the problem. Stabilization of the rate of combustion of lossil fuels combined with a program of refores-tation would contribute toward stabilizing the CO2 content of the atmosphere ... we need not accept as inexorable a global warming due to the accumulation of CO2 in the atmo-

sphere" (Science, 222, 1081-1086, 1983). The conclusions may be correct, but the factors affecting the release of carbon dioxide into the atmosphere are complex. The levels of carbon dioxide in the atmosphere vary, following major seasonal pulses. In the northern liemisphere, spring and summer levels are lower than the average due to the uptake of plants in their growing cycle. The fall and winter seasons experience a major pulse of carbon dioxide from decaying leaves and plants. Superimposed on these pulses are changes such as those related to the rates of

fossil fuel combustion and to a long list of natural seasonal phenomena. To solve the problems of analyzing carbon dioxide effects, the natural CO2 levels and trends in changes of those levels must first be

established. It is necessary to obtain estimates of historic levels of carbon dioxide in the atmosphere, and to determine increases relative to some base. According to the report by Woodwell et al., "The increase in the CO₂ content of the atmosphere over the 120 years since 1860 exceeds 15 percent; it may be as much as 30 percent." And a report about the carbon cycle by R. A. Kerr, concluded that, "The ultimate aim of carbon cycle research is to predict how the concentration of carbon dioxide in the atmosphere will vary as humankind pumps more and more of it into the atmosphere . . . None of these models yet duplicates the present well enough to attempt predicting the future" (Science, 222, 1407-1108, 1983).

Among the many factors being considered in carbon dioxide/atmospheric studies, several points are noted. One is that deforestation will not be a problem it its rate continues. Forests will have disappeared by the first half of the 21st century. This might be considered an example of a change of critical factor, as would the start of reforestation. Other examples include saturation of carbon dioxide in the oceans and release of carbon dioxide from the earth's surface due to global warming. In each case, a contributing factor would denly cease to exist. The interactions of the many factors affect

ing carbon dioxide levels are hard to decipher, but the reasons for attempting it are clear. Woodwell et al. state: "Recent rates of accumulation of CO, have been high enough to produce, if continued . . . approximately twice the amount thought to have been present in 1900." Very soon, therefore, global warning trends that could cause the shift of climatic zones, the displacement of agriculture, the disruption of major vegetation zones, and the rise of sea level by 5 m could

OTA Congressional Fellowship

The Office of Technology Assessment (OTA) is seeking qualified candidates from academia, industry, and government for its Congresional Fellowship Program for 1984–1985. The program, similar to AGU's Congressional Fellowship Program, provides an opportunity for individuals who have demonstrated outstanding ability to gain a better unstrated outstanding ability to gain a better understanding of science and technology issues facing Congress and the ways in which Congress establishes national policy related to

OTA will select up to six fellows for a 1-year program, to begin September 1984 on Capitol Hill. The fellowship is open to men and women of all disciplines who have demonstrated exceptional competency in the physical or biological sciences, engineering, law, economics, environmental and social sciences, or public policy. Candidates must have completed research and training at the disctoral level or have equivalent experience, as judged by the OTA selection committee. Salaries for successful candidates will range from \$25,000 to \$41,000 per year, based on the fellow's current salary and/or training and

Fellowship applicants are required to sub-Fellowship applicants are required to suo-mit a resume (up to two pages) that lists edu-cation, experience, area(s) of special interest; a one-page list of published works; three let-ters of reference; and a statement of roughly 1000 words addressing the applicant's princi-pal expectations of the fellowship program; and expected contributions to OTA during the program. For additional information, write to Congressional Fellowships, Personnel Office, Office of Technology Assessment, Congress of the United States, Washington, DC 20510. Applications for the fellowship and letters of reference should be sent to the above address no later than February 3, 1984. Letters of recommendation should be sent directly to OTA.-BTR

In Congress

USGS Budget Set

In fiscal 1984, the U.S. Geological Survey (USGS) is budgeted for a 2.3% increase in funding over fiscal 1983. Although the fiscal year began on October 1, the Department of Interior appropriations bill, which includes the USGS budget, was not signed into law until nearly a month latter. Here is a summary of the program-level funding for the USGS. The program level represents the actual money—including money from the federal treasury, residual funds, transfers, etc.—

Table 1 compares USGS funding for fiscal 1983, the Reagan request for fiscal 1984, and the final fiscal 1984 program levels based on the conference completed on September 29 between the House and Senate appropria-tions committees. The USGS is budgeted for

\$405.9 million in fiscal 1984, including \$24 million in residual funds for the National Petroleum Reserve in Alaska (NPRA).

Some differences between 1983 and 1984 funding for the activities and subactivities reflect changes in categorization of programs that accompanied recent budget streamlining. Nevertheless, the fiscal 1984 budget mirrors some internal refocusing of priorities. For example, there is an 11% increase in liscal 1984 for both the water resources investigations activity (with the federal program of the national water data system getting a 23% boost) and for the National Mapping Program. The off-shore geologic surveys subactivity will receive a 20% increase and the mineral resource surveys subactivity has gotten better than a 9% boost. Designated for decreases are the subactivities for energy hydrology (down 21%) and

energy geologic surveys (down 12%). The USGS budget is part of the Department of Interior appropriations bill (11.R. 3363), which was signed into law by President Reagan on November 4.—BTR

TABLE 1, USGS Fiscal 1984 Budget Status, Program Levels, in Millions of Dollars

Activity	FY 1983	Reagan FY 1984 Proposal ¹	Find Conference FY 19842
Geologic and Mineral Resource Surveys			
Geological hazards	51.6	40.7	51.4
Land resource surveys	16.8	16.7	17.2
Mineral resource surveys	41.1	45.3	44.9
Fuergy geologic surveys	34.2	25.5	30.1
Ollshore geologic surveys	15.5	13.7	18 6
Subtotal	159.2	141.9	162.2
Water Resources Investigations			
National water data system: federal program	54.2	55.4	titi,ti
National water data system: federal-state (cooperative program	15.8	47 1	49.1
Euergy hydrology	15.1	9.6	11.9
Subtotal	115.1	112.1	127.6
National Mapping Program	81.1	77.9	90.1
Facilities	9.0	13.2	10.4
General Administration	14.9	14.2	15.5
Total, USGS	396.91	365.51	105.95

Source, USGS, Numbers may not total because of rounding,

'See Eos, February 15, 1983, p. 65.

Signed into law (P.L. 98-146) on November 4. Based on a conference completed September 29 between the House and Senate appropriations commutees. See Eos, September 13, 1983, p. 548. Includes \$11.1 million for earth science applications, which was a separate activity in fiscal 1983. It now fally into the surveys and investigations activities. Total also includes \$6.4 million for

the Barrow area gas program.

*Does not include money for National Petroleum Reserve in Alaska (NPRA). Total also includes \$6 million for digital cartography, which had previously been included with National

Mapping Program.

*Includes \$24 million from residual funds for NPRA.

WaterWatch

WaterWatch News of the hydrology section.

Editor: Mary P. Anderson, Department of Geology and Geophysics, University of Wisconsin-Marlison, Madison, WI 53706 (608-262-2396).

Welcome to WaterWatch

The President's Views on Accreditation of Hydrologists

With this issue we inaugurate Water Watch, which is intended to bring news of water and of AGU's Hydrology Section to all readers of Estat least every 3 months. One member of each of the Hydrology Section's technical committees is serving as a topical reporter, feeding information to Mary Anderson, editor of Ere for hydrology, but that is not enough. Quarterly publication of a stibitan-ful feature will require the active participation of many more. I appeal to all members of the Hydrology Section to provide Mary Anderson with newsworthy items.

As Section President 1 plan to use Water-Watch as my primary means of communicating with the membership. Let me begin now with a brief statement on an issue of considerable interest to many of us, the accreditation of professional hydrologists and profes-

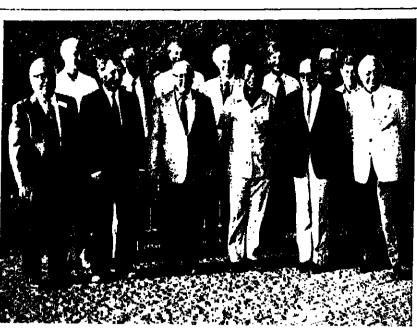
sional hydrogeologists.
As most of you know there is an active movement to create a mechanism for accrediration of hydrogeologists. The motivation for this movement appears to be twofold: (1) protection of the public from unqualified practitioners, and (2) certification of the qualfications to practice of those whose hydrologic training does not match the requirements for registration as a Professional Engineer or us a Professional Geologist. Both motivations are laudable, but both stem from the needs

of professional practice while the American Geophysical Union is a research organization For this reason the Section Executive Committee decided (Eos, September 13, 1983, p. 554; December 27, 1983, p. 1005) not to involve the AGU in this certification movement, feeling that this is more properly a role for an organization such as the American Society of Civil Engineers. At the same time we urge each member to decide individually whether or not to participate.
While this decision may seem arbitrary to

many, particularly to those members whose interests lie primarily in the application rather than the creation of hydrologic knowledge. it is consistent with the efforts of the last several years on the part of the AGU Hydrology Section leadership to improve the image and status of hydrology amount our colleagues from the other sections of the Union, Many of the important geophysical problems of tomorrow will require active cooperation of earth scientists from many sections of AGU (Ithink immediately of the question of climate variability) and to handle these problems together will require a firm basis of mutual scientific respect. Building this respect for hy-drology, through the AGU journal Water Resource Research, through the nature and quality of our technical sessions, and through gaining Union recognition for our most dislinguised members, continues to be my primary goal, as your President. While this decision may seem arbitrary to

many, particularly to those members whose. interests lie primarily in the application rather than the creation of hydrologic knowledge. it is consistent with the ellorts of the last several years on the part of the AGU Hydrology Section leadership to improve the image and status of hydrology among our colleagues from the other sections of the Union, Many of the important geophysical problems of tomorrow will require active cooperation of

(cont. o) p. 10)



International Association of Hydrological Sciences Officers for 1983-1987. The following officers of IAHS are shown shortly after their election at Hamburg, Federal Repubhe of Germany, on August 26, 1983. Front row, left to right: A. Ivan Johnson, President, International Committee on Remote Sensing and Data Transmission (USA); G. Matthess, President, nternational Commission on Water Quality (FRG); Mark F. Meier, Immediate Past President, IAHS (USA); N. D. Avilhotele, Third Vice President, IAHS (Ghana); G. Kovaes, Pusident, IAHS (Hongary), 1. Ulboutty, President, International Commission on Snow and Ice (France), Back row, left to right: 1. O. O'Dannell, Editor, IAHN (UK): 1. Rodrigues-Iturbe, First Vice President, IAHN (Venezuela); H. Uichscher (FRG); V. M. Kolliakov, Second Vice President, IAHS (USSR); M. Hamlin, President, International Commission on Water Resource Systems (UK); 11, C. Riggs, Treasures, IAHS (USA); H. J. Coleuln ander, President, International Commission on friounds after (Netherlands). Not present for the photo was J. C. Rodda, Secretary General,

all members of AGU with interests in this

area are invited to participate in the shaping

of its philosophy and activities. Possible com-

mittee activities already identified include:

spousoring symposia and publications (a

hall-day symposium on the history of hydrol-

encouraging the collection of contempo-

cary historical materials (including oral his-

and historians/archivists to promote interest and awareness of the discipline among such

Close ties with the Geological Society of

America's History of Geology Division and

the newly formed History of Earth Sciences

Society are anticipated. Individuals interested

i participating in the committee's activities are

encouraged to contact the chairperson: Wil-

Mail Stop 431, National Center, Reston, VA

The Urban Hydrology Committee was re-cently amalgamated with the Surface Runoff

The chairman of the Surface Runoff Com-

mittee is Keith Hipel, Department of Systems Design Engineering, University of Waterloo, Waterloo, Ontario, Canada N2L 3G1, 519-

885-1211, ext. 3113. The members of the Surface Runoff Committee warmly welcome

their new colleagues from Urban Hydrology.

Three special sessions are being planned

for the 1984 AGU meetings. Peter Germann

is organizing a session on "Hillslope Hydrolo

gy" for the Spring Meeting, and for the Fall

Meeting, Dave Forelich and Upmanu Lall are planning sessions on "Paleohydrology" and "Dam Satety," respectively. The Surface Run-

off Committee would greatly appreciate any

suggestions that other people may have about

future activities in surface ruoff and urban

hydrology. Kindly feel tree to directly contact

On June 1, 1983, the U.S. Environmental Protection Agency (EPA) and Auburn Uni-versity agreed on a joint project to study how

pollurants spread in groundwater. This pro-

ger is part of a large, ongoing, groundwater terearch program administered by EPA's

Robert S. Kerr Environmental Research Lab-oratory located in Ada, Oklahoma, Af Au-

burn University the contract is administered

by the Water Resources Institute.

arry membe of the committee.

in Groundwater

Dispersion

Committee (Eos, September 13, 1983, p. 554).

liam Back, U.S. Geological Survey, WRD,

22092 (tel.: 703-860-6951).

Urban Hydrology

and Surface Runoff

tories) and the preservation of old data and

facilitating contacts between hydrologists

ogy is tentatively scheduled for the 1984

AGU Fall Meeting)

earth scientists from many sections of AGU (I) think namediately of the question of climate variables) and to handle these problems together will require a firm basis of mutual scienable respect. Building this respect for hythology, through the AGI pournal Water Resomes Research, through the nature and quality of our rechnical sessions, and through gaming fanor recognition for our most distrogued members, continues to be my primary goal as your President. I welcome your comments on this position.

> Peter S. Eagleson AGC Hydrology Section

Reporters for WaterWatch

Erosion and Sedimentation: Katen Prestegrod. Franklin and Marshall College. Dept. of Geology, Box 3003, Lancaster, PA 17601 (717-291-1133)

Remote Sensing: Homas J. Jackson, USDA, Belisville Agricultural Research Center, Belisoffe, MD 20705 (304-34)-3490)

Water Quality: Charles E. Chamberlin, Dept. of Geography and Environmental Engineering, Johns Hopkins University, Baltimore, MD 21218 (301-338-7109)

Groundwater: Jack Robertson, USGS, EGS Mail Stop, 110, Reston, VA 22092 (703-860-

International Reporter: A. Ivan Johnson, 7474 Upham Conn. Arvada, CO 80003

Precipitation: Vijas K. Gupta, Dept. of Civil Engineering, Univ. of Mississippi, Universi-ty, MS 38677 (601-232-5366)

Surface Runoff: Kenh Hipel, Dept. of Sysrems Design Engineering, Univ. of Water-Ioo, Waterleen, Ontario, Canada N21, 3G1 (519 885-1211, ext. 3113) For urban hydrology: Marshall Jennings, USOS, Gulf Coast Hydraulics Lab, NSTL Station, MS 39529 (601-688-1508)

Soil Water: Hubert Morel-Seytons, Engineering Research Center, Colorado State Univ., Fort Collins, CO 80523 (303-191-8549)

Snow and Ice: Jett Dozier, Dept. of Geogra-Autoralia, Santa Barbar, CA 9406 (805-961-2409 or 3563)

Ristory and Heritage: Edward R. Landa, USGS, 1448. Mail Supp. 413, Reston, VA 22002 (704 860 0084)

News & Announcements

History and Heritage Committee

The rewarch is entitled "Experimental and Theoretical Studies of Contaminant Dispersion in Groundwater." Much of the planned The part few years have seen a burst of interest in discipline specific history within the work will center around the performance of a sejentific communities. Wittens the Hydrology beetson during the post year such interest has large field experiment at Auburn University's tracked in the formation of a History and Mobile Field Test Facility. This facility was established over the past decade and now con-Hernage Communice. This committee will Interiore committee that committee was function at a subgroup of AGU's Committee on the History of Geophysics, which was established in 1984. The History and Heritage tains 10 water supply, injection, and observa-tion wells. The Mobile site has been in operation since 1975 and the work performed Committee is still in the embryonic stage, and there, related to thermal energy storage in

The principal investigators are now in the process of constructing the wellfield modifications required to initiate actual field studies. Theoretical work performed during the past 9 months will form the basis for designing a series of tracer tests which will be initiated in late 1983 or early 1984. Manuscripts describing the theoretical background for the project have been submitted to Water Reources Research and to Ground Water. In addition to principal investigators Fred J. Molz, Oktay Güven, and Joel G. Melville of Auburn's Civil Engineering Department and supporting staff, the project will employ a coprincipal investigator, two field engineers, and three graduate students. This news item contributed by Fred L. Molz,

Engineering Experiment Station, Auburn University, AL 36849.

Kisiel Lectures

The Department of Hydrology and Water Resources at the University of Arizona has in stituted a series of lectures to perpetuate the memory of Chester C. Kisiel. The first lecture, "Reflections on Hydrology," was delivered on March 2, 1982, by Nicholas C. Matalas of the U.S. Geological Survey. The text of the lecture has been published as a 16-page booklet and is available at \$3 per copy from the Department of Hydrology and Water Resources. University of Arizona, Tucson, AZ 86521. The second lecture in the series was delivered in March 1983 by Myron B Fiering of Harvard University and its text is now being prepared for publication. The third lecture in the series, by John Bredehoeft of the U.S. Geological Survey. Menlo Park, is scheduled for February 23, 1984, in Tucson.

This news item was contributed by Nathan Buras, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ 86521.

Meetings

Hydrology Days

The fourth annual AGU Front Range Branch Hydrology Days will be held April 24-26, 1984, at Colorado State University. Fort Collins. Special sessions are planned on "Hydrology of the Vadose Zone" and "Surface and Groundwater Models Suited for lanagement of Aquifers and of Stream Aquifer Systems" (Eos., November 22, 1983, 950). Deadline for submission of abstracts s February 21, 1984. Contact H. J. Morel-Seytoux, Department of Civil Engineering, Colorado State University, Fort Collins, CO 80523 (tel.: 303-491-5448 or -8549).

The third annual AGU Front Range Branch Hydrology Days took place April 19-21, 1983. It was attended by 101 students and 39 professionals; 12 students presented papers in the M.S. and Ph.D. categories. Awards were provided for the best student paper presentation in each category, and all students presenting papers received compli-memary books and complimentary student membership in AGU. There was no registra-

tion fee for students. R. Allan Freeze, President-Elect of AGU's Hydrology Section, delivered the keynote address, entitled "Rainfall-Runoff: Scientific Enquiry and Engineering Prediction." Jeris Danielson, State Engineer, presented the first Hydrology Days award for outstanding ions to Hydrology to Professor

Emeritus Robert E. Glover. Members of the organizing committee were H. J. Morel-Seytoux, chairman; H. S. Boyne, . Decoursey, A. Klute, T. B. McKee, F. M. Smith, D. K. Sunada, and J. W. Warner. Several private firms contributed to the costs of the conference: Oit Water Engineers of Denver; Simons, Li and Associates of Fort

Collins; Water Resources Consultants of Den ver, Engineering Hydraulies of Longmont and Hydro-Triad of Lakewood.

Groundwater Geochemistry

A Canadian-American Conference on "Practical Applications of Groundwater Geo chemistry," to be held June 22-26, 1984, at be presented jointly by the Alberta Research Council and The National Water Well Assort ation at the Bantl Springs Hotel, Speakers will include J. Toth, D. Langmuir, Y. Kluraka, N. Plummer, P. Frita, B. Hitchon, E. Wallick, M. Trudell, and R. Knapp. Contib uted papers are invited. For more informtion contact: Ed Wallick, Alberta Research Council, 6th Floor, Terrare Plaza, 4445 Cal gary Trail South, Edmonton, Alberta, Cana

1984 AGU Spring Meeting

Sedimentation Committee

A special session on "Sediment Storage is Rivers and Estuaries" will be held at the AGU Spring Meeting in Cincinnati (Eas, November 22, 1983, p. 950). For information, contact Karen Prestegaard, Department of Geology Franklin and Marshall College, Box 3003, Lancaster, PA 17604.

Groundwater Committee

The Groundwater Committee is sponsoring two symposia for the Spring Meeting (Eos. November 22, 1983, p. 950). A symposium on "Miscible and Immiscible Transport in Groundwater" is being organized by James W. Mercer, Geo Frans, Inc., P.O. Box 2550, Reston, VA 22090 (703-435-4400) and Leonard F. Konikow, U.S. Geological Survey, 431 National Center, Reston, VA 22092 (703-86) 6892). A related symposium on "Field Meliods for Supporting Chemical Transport Models" is being organized by Fred J. Mol. Civil Engineering Department, Auburn University, AL 368-19 (205-826-1326) and May P. Anderson, Department of Geology and Geophysics, University of Wisconsin-Madison, Madison, W1 53706 (608-262-2396), Ab stracts for either symposia should be sent to the organizers before February 6, 1984.

Surface Runoff Committee

A special session on "Hillslope Hydrolog" is planned for the Spring Meeting. More information can be obtained from Perer German, Department of Environmental Science, University of Virginia, Charlottesville, VA 22903 (804-924-0558).

Hazardous Waste

The 80th Anniversary Meeting of the Asse ciation of American Geographers (1710-16th St., N.W., Washington, DC 20000, 202-234-1450) will be held in Washington, D. G., April 22-25, 1984. There will be a session on Public Policy of Siting Hazardous Waste Facilities," which will include papers on groundwater problems.

Forest Uses

IUFRO, the International Union Forest Research Organization is sponsoring a conference on the Effects of Forest Uses on Erosion and Slope stability, to be held May 7-11. 1984, at the Environment and Policy Institute, E-W Center, University of Hawaii, Honolulu. For information, contact Ray Rice. IUFRO Symposium, Redwood Science Institute, 1700 Bayview, Arcata, CA 95521.

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Erosion and Disasters

An international symposium on crosion, debris, flows, and disasters will be held September 3-5, 1985, in Tsukuba, Japan, and is sponsored by the Erosion Control Engineerng Society of Japan. Information can be obained from S. Kobashi, Organizing Secretary, ISWDD 1985, Department of Forestry. Kyoto University, Kyoto 606, Japan. Topics include: sediment transport phenomena, soil erosion, debris flows, landslides and other phenomena, and disasters and prevention

Sedimentation-Related Meetings

The sedimentation committee would like to provide information on several meetings that took place in October 1983.

Geomorphological Field Group

The second annual meeting of the American Geomorphological Field Group was organized by S. Wells and T. Gardner and held in Chaco Canyon, N. Mex., October 7-10. Field excursions included visits to instrumented watersheds in badland areas, examination of

University of Arizona/Postdoctoral Research Posi-

University of Arizona/Postdoctoral Research Posttion in Planetary Atmospheres. Applications are
invited for postdoctoral research positions at the
Lunar and Planetary Laboratory, University of Arizona, in Tucson, Arizona. The two positions will inwolve research in planetary physics and analysis of
UV data from the Voyager mission. Research opportunities for these positions include the bound
and extended atmospheres and ionospheres of the
giant planets and their satellites, the for plasma torus, earth's atmospheres, the interstellar medium,
and the atmosphere and ionosphere of Venus. Applicams should have a strong background in theory
and data analysis. Physicists and astronomets are
encouraged to apply. Curriculum Vitae, libblingtaphy and three letters of reference should be sently
March 1, 1984 to Dr. A. L. Broadfoot, Lunar and
Planetary Laboratory. University of Arizona, 3625

Planetary Laboratory, University of Arizona, 3625 E. Ajo Way, Turson, Arizona 85713 The University of Arizona is an Equal Opportuni-

POSITIONS AVAILABLE

the Quaternary history of Chaco Carryon, and investigation of fluvial problems associated

The AGFG is primarily an organization that seeks to promote discussion of field pro-jects, but it also holds one day of technical sessions. Papers in the technical sessions cover a range of topics on hillslope and fluvial processes. Those interested in the AGFG and its tunne field excursions can get on the mailing list by contacting L. B. Leopold, AGFG, Department of Geology and Geophysics, University of California, Berkeley, CA 94720.

River Meandering

The American Society of Civil Engineers and the International Association for Hydraulic research held a specialty conference on river meandering in New Orleans, La., October 24-26, 1983. Papers were presented on the geomorphology of river meanders, engineering analysis, human impact on meandering rivers, and mathematical and physical modeling of meandering. Additional information about the presentations can be obtained from J. E. Glover, P.O. Box 631, Vicksburg, NS 39180.

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Cover. A 750-m diameter circular mo-

raine viewed from a helicopter flying over the Transantarctic Range, Victoria Land, Antarctica (77°14'S, 162°3'E). The mo-

raine encloses masses of ice and snow that

have fallen from the tip of the Ringer

Glacier, a retreating, hanging structure. The moraine lies on the Miller Glacier,

the surface of which is deeply scored by

subparallel ablation troughs attributed to

the action of windblown dust. The view is

toward the southwestern wall of the valley

that contains the Miller Glacier. (Photo made and contributed by Ursula B. Mar-

vin, Center for Astrophysics, 60 Garden St., Cambridge, MA 02138.)

Washington, DC 20009

Spilhaus, Jr., Executive Director; Waldo E. Smith, Executive Director Emeritus.

Igneous/Metamorphic Petrologist-Oregon State University. This is a new faculty position, 19-month appointment, tenure-track. Candidate is expected to develop a strong research program, applying theoretical, experimental, and/or latest analytical methods to petrological problems, particularly those related to the origin and evolution of oceanic crustislands, and/or volcanic arcs. Research experience with one of the following is desirable: NRF, NRD, stable isotopies (O. N. St. solid source mass spectrometry (Sr. Ph. Nd). Rank is Assistant/Associate Professor, Salary is \$27,000.\$43,000, communicate with experience. Send resume and names of three references by 1 March 1984 to:

G. Ross Heath, Dear C. Rose rigain, Doan College of Oreanography Oregon State University Corvallis, OR 97331 Oregon State University, an Athensative Action Equal Opportunity Employer, complex with section 504 of the Rehabilitation Act of 1973

Faculty Position in Geology/Hunter College.

New York, N.Y. Hunter College, Univ. University of New York, F.4l. 1984. Rank and salary open. Positions for an advanced or starting scientist to take an aggresive role in an expanding research program emphasizing geologic applications of remote sensing, mathematical modeling, statistical data analysis, and related quantitative areas. Research emphasis in geophysics or hydrogeology will be helpful, but not essential. Proven extramutral funding ability is required for advanced level appointment. Experience with government, industry and foreign nations also helpful. Ph.D. required at time of appointment. Send vitae, publications, names of at least three referees to Dr. Alan H. Strahler, Hunter College, Dept. of Geology and Geography, 695 Park Avenue, New York, N.Y. 10021. Closing date March 1, 1984. Equal Opportunity Employer.

Planetary Geologist/Brown University. Tenure track Assistant to Associate Professor position starting July 1, 1984, or as soon as possible thereafter to teach and conduct research in planetary geologic processes on Earth and other planets. Research should be on understanding the physical processes (for example, impact cratering, volcanism, tectonism) responsible for the origin of planetary surfaces. Applicants must have Ph.D. in planetalogy, geophysics or geology. Deadline for applications is March 1, 1984. Interested parties should send vita and names of at least three persons we may contact for recommendations to: M.J. Rutherford, Chairman, Department of Geological Sciences, Brown University, Providence, R1 02912.

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University of Arkansas/Tenure-Track Position— Structural Geology. Applications are invited for a tenure-track position in structural geology/tectonics, beginning Augus, 1984. The Ph.D. is required. Candidates who will strengthen our anticipated Ph.D. program with research interests in field-ori-ented studies of rock deformation, rock fabrics (or postamorobism) or the tectorics of active margins metamorphism), or the tectorias of active margins which would complement growing programs in geophysics, sedimentation, and petrology are encouraged to apply. The successful applicant will direct graduate research and maintain this program with outside funding as well as teach undergraduate and graduate courses in structural geology and tectorics, an occasional course in introductory geology, and provide some support for the Montana field camp. Rank and sniary are open, depending upon experience and qualifications. Applicants should submit a resume and statement of feeding and research interests directly and arrange to have at least 3 letters of recommendation sent to Robert C. Morris, Department of Geology, University of Arkansas, Fayetteville, AR 72701. Phone 501-575-3365. Deadline for all material is March 31, 1084.

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Senior Research Associate in Astrophysics: Lunar and Planetary Laboratory, University of Arizona. Applications are invited for a Senior Research Associate position in ultraviolet astronomy at the Lunar and Planetary laboratory, University of Arizona in Tucson, Arizona. The position will involve the analysis of low resolution FUV and EUV stellar spectra obtained from the Ultraviolet Spectroneters on board the Voyager i and 2 spacecraft. Applicants are expected to have a ductoral degree and at least two years' experience in analysis of stellar data. A background in planetary atmospheres and familiarity with interactive computing are also desirable. Candidates should submit a leuer of application with vita, bibliography, and three letters of reference by January 30, 1984, to Dr. A. L. Broadfoot, Lunar and Planetary Laboratory, University of Arizona, 3628 E. Ajo (Vay, Tucson, Arizona 86713.

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Two Faculty Positions/University of Illinois.
The Department of Atmospheric Sciences, University of Illinois at Urbana-Champaign has two openings for faculty positions effective Fall 1984.
Applications are invited for the rank of either tenure track Assistant Professor or tenure level Associate Professor in Aumospheric Science, Application ciate Professor in Atmospheric Science. Application are encouraged from individuals in all specialties of are encouraged from individuals in an speciaties of atmospheric (and occanographic) sciences although preference will be given to those who specialize in the areas of climate dynamics, large-trale atmo-spheric modeling, and satellite metocoology. The prospective lacitity member is espected to develop an attice research program involving grachiate stu-dents and to do a moderate amount of teaching of undergraduate and graduate consess with the oppor-tunity of deeloping courses in his/her specialized held. The salary will be commensurate with the can-

didate's experience. A Ph.D. in meteorology, occanography of other closely related held is required. Those interested should send a resume, a list of all publications and the names of three references before March 31.

Professor Voshi Ogona, Head Department of Atmospheric Sciences University of Illimis (10) West Springheld Avenue Urbana, 11, 61801 217-333-2192

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University of Oklahoma/Electronics Instrumenta-tion Specialist. The School of Goodogy and Geo-physis waverping applications for a full-time bles-tronics Instrumentation Specialist Principal respon-sibilities will include maniferance, cabbi aroon and user instruction for a new, computer automated Rigidot NRD-NRF system, and finantenance and re-pair of electronic components of other lab tachines in the School. Additional opponiumnes could in-clude involvement in the University's electron in croscopy lab (SFM and TFM), and the development of a Van de Graaf-PINE analytical system to rol-laboration with O.U. physicists Applicants should have a B S, in Geology, Chermony, or Electrical En-gineering or equivalent in experience, salary is com-mensurate with qualibrations. Send curviculum vi-tae and names and addresses of three professional references to: Rigako XRD-XRI system, and maintenance and re

Dr. David London School of Geology & Geophysics University of Oklahoma Conversity of Oklahoma Norman, Oklahoma 73019 Deadline for applications is March 15, 1984. The University of Oklahoma is an affirmative ac-tion/equal opportunity employer.

Postdoctoral Research Fellowships/Caltech. The Dission of Geological & Planetary Sciences at the California Institute of Technology expects to ofter postdoctoral research fellowships in one or more of the following areas: geology, geophysics, geochemistry, and planetary science. Interested persons are asked to contact Dr. Peter Wylke, Dission of Geological and Planetary Sciences, California Institute of Technology, Pasadena, CA 91125.

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Analytical Chemist-Geochemist/University of California.

B.S. or M.S. level with sound basic knowledge of analytical techniques is sought to assist in a laboratory pursuing basic research in geochemistry, geochronology, and isotope geology. Training in methods of ion-exchange and mass spectrometry provided. Immediate opening. Position must be liked by March 1, 1984. Contact Dr. Donald J. DePaolo, Department of Earth and Space Sciences. University of California, Los Angeles, CA 90024.

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Seagoing Science Office/Research Assistant. Applications are invited for a position as Science Officer in Ship Operations at the College of Oceanagraphy, Oregon State University. The following duties are to be performed, with the aid of one full-time assistant and a number of specialized technicians: (1) to provide the interface, both on land and at sea, between the Marine Facility and scientific project personnel carrying out shipboard research programs, and (2) to assume responsibility for the care of common-use equipment.

Approximately 240 days at sea are to be shared with the assistant Qualifications include experience at sea, experience with electronics and computers, and a Bacheboe's degree. Salary is \$25,000% car plus \$25,54ay sea pay. Staft date is 1 March 1984. To apply, send resume with mannes and addresses and telephone numbers of three employment references by 31 January, 1981 to

by 31 January, 1984 to:
Ship Operations Office
College of Oceanography
Oregon State University
Corvallis, OR 97-34
Oregon State University at Alfarmative Action/
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Mineralogy-Petrology/University of Massachusetts.

The Department of Geology and Geography invites applications for a Sabbatia decore replacement
for the Fall, 1984, and Spring. 1985, semesters Respondibilities will be to trach an undergraduate
contern numeralogy one so trester petrology the
other, plus one additional graduate course in the
conducte's held of interest (preferably typeous petrology). The successful cambiate is encouraged to
conduct research, to make use of the Department's
Regional Analytical Lachty (increprobe, XR).
XRD, Latin experimental laboratory and to pai to quate in the Competition Valleys 5 College (Cinversity, Analytical Santh Mr. Holyoke, Hampshire)
geography programs. Interested applicates (incremPh.D. or mature it searchers) should submit a comprehenoise Value and the names of a least 3 relatices by February C., 1984, to Professor S.A. MoissaDepartment of Geology and Geography, University Department of Geology and Geography, University of Massathusetts, Araberst, MA 01903 (LMAS) Antherst van Albimance Action Equal Opportunity Employer

University of Colorado-Boulder—Tenure Track Position in Atmospheric Dynamics. The Deput-ment of Astrophysical Planetay and Atmospheric Position in Atmospheric Dynamics. The Department of Astrophysical, Planetary and Atmospheric Sciences (Formeric Astro-Coophysics) invoces applications for a remore track Landis position in the field of atmospheric science. The successful applicant must have a Ph D degree and should possess a strong background in geophysical fund dynamics or dynamic meteorology, preferably in modeling large-scale terrestrial and/or planetary originations. The appointment will be at the assistant profusion level (although the associate professor level violation) and will begin August 29, 1984.

Applicants should have a strong commitment to research and to teaching at the graduate and undergraduate level. The opportunity will exist for a formal association with the Laboratory for Atmospheric and Space Physics, which has ongoing programs of space observations of planetary atmospheres.

To apply, please send a curriculum vita and the names and addresses of three references to:

Professor Gary E. Thomas

Department of Astrophysical, Planetary and Atmospheric Sciences

Campus Box 391

University of Colorado

Boulder, CO 80309

Telephone: 303-492-8913.

Salary: \$24,000 minimum.

Application deadline: Postmarked no later than March 15, 1984 (Later applications will be accepted if the position is not filled)

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Short Course in Basics of Ground Water Modeling March 1-9, 1984

March 1-2 Introduction to Ground Water Medeling

Various types of models and model applications are discussed in this two-day introductory course. This module, presented by IGWMC staff members Paul K.M. van der Helide, Aly I. El-Kadi and P. Srinivasan, is designed to give an appreciation of the usefulness of numerical models and awareness of modeling related problems.

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A five-day course in which James W. Mercer, Leonard F. Konikow and Peter F. Anderson will present the mathematical foundation underlying ground-water models and in which two-dimensional flow and solute transport models developed at the U.S. Geological Survey will be introduced. The course includes problem sessions at Butler University's computer center.

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QUALIFICATIONS: A PhD degree or equivalent qualifications with extensive experience and substantial evidence of original resourch achievement in the field of physical oceanography, or a clearly related quephysical describing. Applicants should describly have had substantial expenence and success in the design and conduct of olishare occanographic experiments. and the interpretation of their results in relation to available theory and applications, and/or substantial success in the development and ventication of theoretical models of ocean or almosphere dynamics, and a combination of analytical and numerical expertise

TENURE: Indefinite with Australian Government superannuation benefits available APPLICATIONS: Stating full personal and professional details, the names of at least two reference and questing reference Nos A6814 and A6815, should be directed to:

> The Chief CSIRO Division of Ocennograph GPO Box 1538 HOBART TAS 7001 AUSTRALIA By February IO. 1984

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Visiting Professorshipi Meteorology. August 16, 1984 to June 15, 1985. Some variation of these dates is possible. Excellent opportunity for individual who desires to do research while teaching a very light load in the field of his expertise. The U.S. Navad Academy, located in Historic Annapolis on the thore of beautiful Chesapeake Bay, is near Washington, D.C. and Baltimore, MD. Salary commensurate with applicant's background. Considerable latitude of action exists in travel, publishing, etc. Within limitations funding for travel is available. Earned Ph.D. repitred. Please send resume and list of publications together with the names and addresses of three references to: Professor John F. Hoffman, Chaintan, Faculty Search Committee, Occanography Department, U.S. Naval Academy, Annapolis, MD 21402. Cloving date: January 31, 1984.

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University of Wisconsin-Madison/Tenure Track Position. The Department of Gordon and Con-University of Wisconsin-Madison/Tenure Track Position. The Department of Geology and Geophysics invites applications for an anticipated tenure-track position at the assistant-professor level in applied geomorphology and hydrogeology commencing in August 1984. The applicant should be committed to developing a strong research program as well as teaching undergraduate courses in some aspects of engineering and environmental geology. The Ph D. is required. Applicants with course work in engineering and an interest in the field application of geologic principles are especially encouraged to apply.

tion of geologic principles are especially encouraged to apply.

Send letter of application outlining your professional goals, transcripts, resume, copies of publications, and three letters of reference to Dr. David M. Mickelson, Department of Geology and Geophysics, Weeks Hall, University of Wisconsin, Madison, WI 53706.

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Center for Ocean-Land-Atmosphere Interactions:
Department of Meteorology, University of Maryland, Coffege Park, MD.—The Department of Meteorology at the University of Maryland has established a center to study the interactions of ocean, atmosphere, and Land processes and their impact on climate variability, and in particular to study the feasibility of dynamical prediction of short-term climate fluctuations. Applications are invited from qualified scientists to join the center at its in eption. The center has openings for two partially state supported tenure has positions at Assistant/Associate Professor level, one Research Scientist, one Research Assistants Qualifications for these positions are described below.

1. Assistat of Associate Professor, One tenure line

mine Qualitacitions for these positions are designed below.

1. Assistant as Assistate Professor: One terrarie line position for Orean Modeling. The applicant should have good knowledge of occanic and atmosphere dynamics, should also have the ability to develop or ear models and carry out research on variability and predictability and predictability of short term climate using coupled occationatesphere models.

2. Assistat of Associate Professor One tenure line position for Associate Professor One tenure line position for Associated Professor One tenure line position for Associated presearch on Geophysical Fluid Dynamics, Contributions to the study of atmosphere professor of carry out outstanding research on Geophysical Fluid Dynamics, Contributions to the study of atmosphere professor of considered desirable.

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A special grant from U.S. EPA has allowed us to offer this low regestration fee

The registration fee includes two limehems, one branch and all refreshment breaks, Symposium proceedings are not included in the fee. Advance regist nation for this meeting is strongly recommended and is subject to continuation. Persons with confirmed conference registration who do not attend and who do not cancel their registration prior to January 27, ion a will be held liable for the entire registration fee. Substitutions may be

'Student Rate—The special student registration fee is offered for individuals who are, at the time of the conference, full-time college students. Students must possess and show, at time of registration, current valid college identification to qualify for the student fee. The student fee does not include meals or breaks.

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A block of rooms at the Sheraton San Antonio has been held for participants in this conference. The special conference rate is \$39.50 for a single from and \$15.50 for a double room. Participants must make their own reservations by corresponding directly with the Sheraton San Antonio or another local hotel of their choice. Call or write: Sheraton San Antonio, 1400 Austin Hwy., San Antonio, TX 78209, (512) 824-5371. Reservations should be made well in advance.

FOR ADDITIONAL INFORMATION

Regarding program content, contact David Niclsen. Regarding registration, contact Diana Kean. Both can be contacted at: National Water Well Association 500 West Wilson Bridge Road WorthIngton, OH 43085 (614) 846-9355

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University of Georgis/12-month tenure-track faculty appointment in the School of Forest Resources.

Qualifications: Ph.D in hydrology or forest hydrology with at least one degree in forest resources. Background should include forest resource management and quantitative sciences. Responsibilities: Teach undergraduate and graduate level courses in forest hydrology and watershed management. Develop a research program in an appropriate area of forest hydrology. Rank: Assistant or Associate Professor, commensurate with qualifications. Salary: Commensurate with training and experience. Position available: July, 1984. Applications: All applications must be postmarked no later than 1 February 1984. Submit resume, transcripts, and names of at least three references to: Faculty Positions: Physical, Biological, Geological, and Chemical Oceanography. Nova University Oceanography Center has vocancies at the faculty level in these disciplines. The applicant must have the Ph.D. degree in a related science and a demonstrated competence in higher field. Limited teaching opportunities are available. The successful applicant is expected to obtain funding from sources outside the University by the end of the first year. By April 1, 1984, the applicant should send a resume and the names of three references to: Dr. Julian P. McCreary, Jr., Director, Nova University Oceanographic Center, 8000 N. Ocean Drive, Dania, Fl. 33004. An alternative action/equal opportunity employ-

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University of Hawsil/Marine Geophysics. Hawaii Institute of Geophysics and Department of Geology and Geophysics invite applications for existing and anticipated openings in Marine Geophysics Applicant's specialty may be in the maine applications in any one or more of seismology, geomagnetism, gravity, heat flow, and physical volcanology, Our choice will be based mainly on the scientist's record of the investment of the scientist's record of the investment of the scientist's record.

Choice will be based mainly on the scientist's record of (1) investigations at second retroit, igneous, sectimentary, or hydrothermal processes, on or below the sea floor, such as at tidgecresty, trenches, transform faults, slopes, and scamonists, and (2) albities and interest to teach in geology and geophysics at introductory as well as at advanced levels. One position will be filled at the professor level it a sufficiently qualified scennist applies. Interested persons should send a statement of their research and teaching interests, a resume, a bibliography, and a list of three referees, before 15 February, 1984, to Dr. Charles E. Helsley, Director, Hawaii Insume of Geophysics, University of Hawaii, 2525 Correa Road, Honolulu, HI 96822

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University of Hawaii is an Equal Opportunity/At-furnative Action employer and invites applications from, and nominess of, women and members of run-

Ceophysics-Tectonophysics/University of Wyo-ming. Applications are invited for a tenure track position at the Assistant Professor level in the De-

. Klaus Steinbeck, Chairman Hydrologist Search Committee School of Forest Resources University of Georgia Athens, GA 30602 Telephone 404-542-1376 Structural Geologiat/University of Maryland. The Department of Geology, University of Maryland at College Park, seeks a structural geologist to fill a tenure track position at the Assistant Professor level by August, 1984. The applicant should have a compilment toward quality persons and a constitute of the control of t by August, 1984. The applicant should have a com-minment toward quality research and can contribute to a rapidly developing M.S. and Ph.D. program as well as an established undegraduate component. Teaching responsibility includes structural geology, tectonics, and applied geophysics.

The College Park campus is located in the Wash-ington metropolitan area close to USGS, Carnegie Institute, Smuthsonian Institution, Cordinard Space Flight Center, NBS and U.S. Bureau of Mines. For full consideration, applicants possessing Ph.D. should send a curriculum vitae, three letters of ref-crence, and a description of research no. Dr. Roger Niclsen, Search Committee Chairman, Department of Geology, University of Maryland, College Park, MD 20741, 301-454-3548.

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Summer Assistantships/National Astronomy and Ionosphere Center. NAIC will be conducting a Summer Student Program at the Arctibo Observatory in Puerto Rico. Areas on interest are Armospheric Science, Planetary Radar Astronomy, Radio Astronomy, Electronics and Computer Science. The assistantships are normally for ten weeks with the starting date being flexible. Graduate students and undergraduates who have completed at least three years of undergraduates to animing as of next summer are eligible. Travel costs to and from Puerto Rico will be paid by NAIC. Application forms, which must be submitted by February I, 1984, are available from the Office of the Director, NAIC, Space Sciences Building, Cornell University, Itlaca, New York 14853.

cientes Building, variati Cinversity, Italica, New York 14853. Cornell University is an equal opportunity/alfir-

Applied Geophysics/Bolling Green State
University. The Department of Geology invites application for a tenure track, assistant professor position in Applied Geophysics to begin September 1984. Ph.D. required. The successful candidate will be expected to develop a research program in some aspect of Applied Geophysics and teach courses in Geophysics. Exploration Geophysics and in his or her specialty.

The Department has eleven fulltime faculties. In addition, two faculties from the Physics Department participate in our geophysics program. Complete geophysical instrumentation, including a seismograph station and rock mechanics lab, is available. Interested persons should send resume, statement of research interests, official transcripts, and three letters of reference to: Charles M. Onasch, Chairman, Search Committee, Department of Geology.

man, Search Committee, Department of Geology, Bolling Green State University, Bolling Green, OH

The closing date is March 15, 1984. BGSU is an equal opportunity affictnative action.

University of Washington/Geophysics—Research Faculty Positions. Applications are invited for two or three operatings for research faculty, Individuals are to establish innovative and high-quality research programs (including salaries). Cambidaies with interests in the following subfields are particularly encouraged to apply: seismologists with experience and interests in volcanic earthquakes and associated phenomena and glaciologists with experience in ice cap flow modeling or in avalanche mechanics. Send curriculum vitae and four letters of reference prior to 15 March to Professor Ronald T. Metrill, Geophysics Program AK-50, University of Washington, seattle, WA 98195.

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Mineratogiat/Petrologiat/Geochemist—South Dakota School of Mines. A position as Research Sciential I (research equivalent of assistant professor) is currently available in the Institute for the Study of Mineral Deposits (ISMD) at the South Dakota School of Mines and Technology, Rapid City, South Dakota. A Ph.D. degree in the general areas of mineralogy-petrology-geochemistry is required and the Ph.D. degree must be in hand before assuming the position with ISMD. The successful applicant will interact with the several research programs conducted by ISMD with special emphasis on the mineral deposits of the Black Hills, South Dakota. Major research responsibility will concern a long-term, indepth study of strataform gold deposits in the Black Hills. ISMD has a fully automated (WDS + EDS) mkroprobe and a new state of the art automated atomic absorption spectrometer with inductively coupled plasma torch (AA/ICP) for major, minor and trace element analysis. Arrangements are in place for neutron activation analysis (Battelle, Richland, Washington) and light stable isotope analysis (U.S.G.S.).

(U.S.G.S.).
Candidates for the position should send resumes and three letters of recommendation to:

J.J. Papike, Director, ISMD
South Dakota School of Mines and Technology
500 East St. Joseph Street
Rapid City, South Dakota 57701-3995
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position at the Assistant Professor level in the De-partment of Geology and Grophysics. Cambriates should have teaching and research interests in such areas as tectomophysics, thermal modeling and/or plate tectomes. The successful applicant self-purpose will include teaching undergraduate and graduate level geophysics courses, and establishing a vigorous research program. Excellent oportunities exist for cooperation with mathematics: the Mathematic De-partment includes a strong numerical methods group with interests in geophysics. Send resonne, transicipts and three letters of recommendation by January 15, 1984 to Peter N. Shive, Dept. of Geolo-gy/Geophysics, PO Box 3006, University of Wyo-ning, Laramic, WY 82071.

The University of Wyoming is an equal opportu-nity/affirmative action employer. Oceanography/FSU. Assistant Professor in Marine Chemistry or Biogeochemistry. Chemical Sedimentology or Amosphetic Geochemistry. Applications invited for position starting with 1981-85 academic year. Contact by 1 March 1981: Chemical Oceanography Search Committee, Department of Oceanography, Florida State University, Tailahaysee, Fl. 32304, Telephone: 901-644-6705
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University of Iowa/Faculty Positions. The Department of Physics and Astronomy anticipates two openings for tenure-track assistant professors or visiting faculty at any level in August 1984. In exceptional cases a term or tenured appointment at the associate professor or professor level will be considered. Preference for one position will be given to an experimentalist in intermediate or high energy physics. Current research interests in the department are radio and outled astronomy and the folphysics. Current research interests in the department are radio and optical astronomy and the following specialties in physics: atomic, condensed mater, elementary particle, laser, nucleor, plasma, and space physics. Yaculty duties include undergraduate and graduate teaching, guidance of research students and personal research. Interested persons should submit a resume and a statement of research interests and arrange for three letters of recommensnould submit a resulting and a statement of research interests and arrange for three letters of recommendation to be sent to Search Committee, Department of Physics and Astronomy, The University of Iowa, Iowa City, IA 52242.

The University of Iowa is an equal opportunity/

ENDOWED PROFESSORSHIP NUMERICAL HYDROLOGY

The University of Alabama is pleased to announce the establishment of an Endowed Professorship in Numerical Hydrology in the Department of Civil Engineering. Nominations and applications are invited for this key position of leadership. The holder of the Professorship will be expected to provide leadership in research, graduate leaching and interchange of ideas with other departments and research entities on and off-campus. Applicants should have a declarated degree in an appropriate area and must have pus. Applicants should have a doctoral degree in an appropriate area and must have demonstrated leadership abilities in the research areas of numerical and/or statistical methods as applied to such areas as typified by surface hydrology, groundwater hydrology, urban hydrology, river and coastal engineering, migration and dispersion of hazardous wastes, geothermal hydrology, real time hydrologic forecasting. Registration as a professional engineer is desirable. Nominations and applications with names and addresses of three references about the cent to: addresses of three references should be sent to:

Assistant Dean Gary C. April, College of Engineering THE UNIVERSITY OF ALABAMA University, Alabama 35486

DIRECTOR CENTER FOR EXPLOSIVES TECHNOLOGY RESEARCH

The Rio Grande Research Corridor initiative of the State of New Mexico is part of a major effort to enhance high-technology economic development in the State by building upon an existing base of research and development capabilities. The Corridor, extending 300 miles along the Rio Grande River Valley from Los Alamos to Las Cruces, is host to live major federal laboratories and three state-supported doctoral-granting universities. As part of this economic development effort, the State has funded establishment of centers of technical excellence at the universities, one of which is the Center for Explosives Technology Research at the New Mexico Institute of Mining and Technology. State funding for the Center for Explosives Technology Research is \$1.3 million for the present fiscal year and is projected at \$6.5 million over

The Center's mission is to conduct basic and applied research focused on the application of high-energy-rate technology to materials and processes, to develop new techniques and processes suitable for industrial application, and to work with industry in joint ventures to effect the transfer of this technology to the private sector. Interdisciplinary programs will involve areas such as shock physics and chemistry, explosives formulation and characterization, metallurgical processes of high-energy-rate fabrication, computer modeling, high-velocity impact phenomena, and the controlled fracture and tragmentation of materials. The Center will draw on resources from existing programs in the departments of Metallurgical and Materials Engineering, Mining Engineering, Physics, Geophysics, Chemistry, and Mathematics. Additional expertise and facilities are available from the Terminal Effects Research and Analysis Group, which operates a complex of field sites dedicated to explosives research and testing in a 12-square-mile facility adjacent to the campus, and from cooperation with the Los Alamos and Sandia National Laboratories, as enabled by the Stevenson-Wydler Technology Innovation Act of 1980.

A sentor scientist with outstanding credentials in research and administration is being sought to direct the Center. This is a full-time, 12-month, joint appointment as a senior research scientist in the Research Division and as a full professor in an appropriate department of the College Division. As Director, this individual will be responsible for development of the Center as a world-class organization for research, technological development, and graduate instruction. The Director will oversee the development of staff and facilities, will coordinate efforts of the Center with other related activities within the Institute and with the National Laboratories and other members of the Rio Grande Research Corridor community, and will assure an aggressive program of research and cooperative ventures with industry.

The position requires an individual with an outstanding record of research in a related field and with demonstrated abilities in the development of major research programs. Leadership qualities and ability to organize and manage research and development partnerships with industry are essential. Salary will be competitive with comparable positions in both the public and private sectors. Nominations and applications, with curriculum vitae and three references, should be submitted before 15 February 1984



CETR Search Committee c/o Research and Development Division New Mexico institute of Mining and Technology Campus Station Socorro, NM 87801

New Mexico Institute of Mining and Technology an Allimative Action Equal Opportunity Employer

Microprobe Technician/South Dakota School of Mines and Technology. Applications are invited for a position as microprobe technician for the laustitute for the Study of Mineral Deposits. The inicroprobe is an ETEC (MAC-5) with 3 spectrometers with Krisel automation and a quantitative PCT energy dispersive system. The successful applicant will be responsible for the day-to-day operation of the instrument including maintenance and repair of hardware, development of software, routine analysis of minerals, and assistance to students. A background in electronics is required. Salary commensurate with experience and qualifications.

Applicants should send a resume and three letters of recommendation to [J. Papike, Director, Institute for the Study of Mineral Deposits, South Dakota School of Mines and Technology, Rapid City, South Dakota 57701–3995. Closing date: March 31, 1984. For additional information, call (605) 394-6152.

SDSM&T is an affirmative-action/equal opportu-

Arizona State University/Postdoctoral Research Associate. Thermodynamics of phase transitions, solid solutions, order-disorder, glasses and melts. Prof. A. Navrorsky, Hept. of Chemistry, Arizona State Univ., Tempe, AZ 85287. (602) 965-4241. Arizona State University is an Equal Opportunity/ Affirmative Action Employer.

Water Resources Engineer/Hydrologisti Faculty Position. A tenure track faculty position at the Assistant or Associate Professor level is available beginning Fall 1984 for a water resources engineer with specialization in hydrology. Applicants must have a Ph.D., and their research interests should encompass pollutant transport phenomena in the groundwater environment traduate teaching responsibilities will include courses in both surface and groundwater hydrology. A resume and names of three references should be sent by March 31, 1984 for Dr. Francis A. DiGiano, Charman Scarch Committee, Department of Fuvironmental Sciences and Engineering, School of Public Health 201-14. University of North Carolina, Gaspel 16th, NC 27514.

The University of North Carolina is an equal op-portunity/affirmative action employer.

Microprobe Technician-Operator/University of Maine at Orono. Subject to budgetary approval, the Department of Geological Sciences at UMO will have this position available by February 1, 1084. Person appointed must be capable of bringing an automated MAC 400S probe on line as a rootine instrument; also able to instruct students on its operation. Similar capabilities with a mass spectrometer highly desirable. Some geologic background preferred, initial appointment for one year with likelihood of subsequent reappointment. Salary in the range of \$17.000-\$20,000/year. Apply to: C.V. Guidotti, Department of Geological Sciences, University of Maine at Orono, Orono, Maine 04 169.

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University of Toronto Postdoctoral Postdon in Ore Deposits/Oceanography. A two or three year postdoctoral postdon is available immediately to study the geology and geothernisty of hydrothermal polymetalic suffide deposits of the present-day ocean filor and their ancient analogues on land. The position will require held work on ore deposits and in the northeastern Pacific Ocean as well as occasional teaching in undergraduate and graduate courses. Preference may be given to candidates with research experience on ocean-floor polymetalic sulfides or ancient volcanogenic massive sulfide deposits and a willingness to fearn about the other. Remineration is at standard rates see by the Natural Sciences and Engineering Research Council of Canada (NSERC) which currently is \$17,500 to \$20,700 per vear depending on experience.

vear depending on experience.

Applications with resume and addresses of three referees should be sent to:

Dr. Steven D. Scott Department of Geology University of Toronto Toronto, Ontario University of Toronto is an equal opportunity/al-

Geophysicist Position/University of Colorado, Boulder. The Department of Geological Sciences. University of Colorado, Boulder, invites applications from geophysicists for appointment to a tenure track faulty position. Applicants research interests should be in some aspects of crostal deformation, with emphasis on the use of modern geodetic techniques for the solution of geodynamics problems. The successful applicant will have opportunities for collaboration with strong research groups in the Cooperative Institute for Research in Environmental Sciences (CIRES) and the Jonn Institute for Laboratory Astrophysics (JHLA) of the University. This faculty member is expected to contribute to the undergraduate and graduate instructional programs by teaching courses in theoretical and/or applied geophysics, as well as assisting in the teaching of courses for non-science majors. The appointee is expected to maintain a vigorous research program, which will include the direction of graduate students in the geophysics program. Applicants must have received a Ph.D. degree and preference will be given to those with one or more years of productive post-doctoral experience. This position will be lifted in the assistant professor level. The academic year salary range is \$22,000 to \$30,000.

The desired starting date is September 1, 1984. The closing date for applications is March 1, 1984. The closing date for applications is March 1, 1984. The closing date for applications is March 1, 1984. The closing date for application is March 1, 1984. The closing date for application is March 1, 1984. The desired starting date is and reprints of insitium position publication list and reprints of insitium of the Search Committee. Attention: Polich Filis, Department of Geological Sciences, University of Colorado, Campus Box 250, Boulder, CO 80399.

The University of Colorado is an equal apportunity/albrautive action Section 504 employer. Geophysicist Position/University of Colorado,

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Seismalogist Virginia Polytechnic Institute and Sestimations to original constraint institute and State University. The Department of Geological Section of Virginia Tech matter applications for an arthresial tenure track Laculty apparatum or at the panor knot in Netherton Sestimatogy, Ryse arch to edition in Indian exempter. VIIIRCSE 18 Section of the control of the complete VIIIRCSE 18 Section of VX II 780 comparer using DIGRON DISCO

Applicants must demonstrate a strong research record; preference will be given to those with expensure in the theoretical and observational aspects of rellection scionology. Faculty members are expected to teach at both the undergraduate and graduate levels, supervise M.S. and Ph.D. theses, and conduct an active research program.

Applicants should send a resume and the names and addresses of three referees to:

J.A. Snoke

Department of Geological Sciences

Virginia Tech

Blackfurg, VA 29061

The appointment will begin September 1984 and candidates are expected to have completed requirements for the Ph.D. by that time. The application deadline is March 15, 1984.

Virginia Tech is an equal opportunity/albrimative

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Atmospheric Scientist/Radiophysicist—M.I.T. A scientist is required to join the staff of the Haystack Observatory, (operated by M.I.T. on behalf of the Northeast Radio Observatory Corporation) to conduct a program of experimental investigation into the dynamics of the troposphere and stratosphere. The work will be carried out at the adjacent Mill-stone Effil Ladiity using a 150 ft. diameter steerable radar which can seture returns from clear air turbulence. The successful candidate will be expected to have a Ph. D. degree obtained for research conducted in a related held, and a demonstrated ability to carry out an experimental program entailing data acqueitton, analysis and theoretical interpretation. Several years experience using high-power radar for research or conducing other experimental investigations into annospheric dynamics would be particularly schalable. Contact Dr. J.V. Evans, Director, Haysta k Observancy, Westford, Mass., with resumes and relevances.

vames and references.
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STUDENT OPPORTUNITIES

Graduate Research Assistantships in Geophysical Michigan Technological University. Pateomagnetism: Research to determine the mico temper mineralization in the Portage Lake Lava Series using paleomagnetism. Applicant should have an interest and buckground in pertudogs.

Seamologs—Microwismicity work along selected segements of the Koscenias Raft. Interest in geophysics with hackground in geology.

Both assistantships M.S. Jevel, 55,250/academic sear play mitimus, variable summer stipend.

Connet: Professor Gordon Framii, Department of Gorlogy and Gordogical Engineering, Michigan Lechnological University, Honghon, MI (1903).

Michigan Lechnological University is an annual of Michigan Lechnological Conservation of the Michigan Conservation of the Michigan Lechnological Conservation of the Mi

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Openings are available for ourstanding undividunits verking an M S or Ph.D. degree in graduate
studies in atmosphene sciences for successful applicants, these positions include 122-time research
assistantiships with stating salanes ranging from
\$8,000 to \$12,500 T2 months, depending on the degree being sought and the student's qualifications.
All tumon and feet are also covered by the Institute,
Complete applications with supporting the unrentanon-should be received no later than March 15,
1981.

Interested waterm should write to

Dr. Douglay D. Davis School of Geophysical Sciences Georgia Institute of Technology Atlanta, GA 30332.

Special Issue in JGR-B

The Journal of Geophysical Research, B. will publish a special issue in 1985 focusing on the results obtained using a variety of new seafloor mapping tools (e.g., SEA BEAM, SEA MARC I and II, GLORIA, GEOS-3 and Seasat radar altimetry). Liberal use of color and large-format black and white figures are encouraged. Special reduced rates for color will apply. The submission deadline is September 1, 1984; publication is planned for July or August 1985.

Papers describing results obtained using these new mapping techniques in a variety of active margins, passive margins, seamounts) are solicited as well as papers describing instrumentation and data processing and interpretation techniques. For further information contact Gerald Schubert, Editor of JGR - B or Robert Detrick, Associate Editor for this volume, at the addresses below

Gerald Shubert, Editor Journal of Geophysical Research Dept. of Earth & Space Sciences University of California Los Angeles, CA 90024 213-825-4577 or 824-5665

Robert S. Detrick Graduate School of Oceanography Narragansell Bay Campus University of Rhode Island Kingston, RI 02881

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Meetings



1984 AGU Spring Meeting: Update

Abstracts must be seceived at AGU by 5 P.M. on February 22 to be on time. I-str aperator of the core by american per related by fereigram charranan, (2) mas ner ber gutte. adrel in alcance of the meeting, and (3). if accepted, will be charged a \$25 late Ice m soldings to the regular publication s harge

The 1984 Spring Meeting of the American Geophysical Union will be held in Cincinnati, May 14-18, at the Cincinual Convention Exposition Center. Blocks of sleeping rooms are being beld at the Clarion (formerly Stouffer's) and Netherlands bosels for those attend-

ing. Corresponding authors will be sem housing and registration forms. In addition, the forms will be published in a future issue of Eas.

General Regulations

 Abstracts may be rejected without consideration of their content if they are not re-ceived by the deadline or are not in the proper format. Abstracts may also be rejected if they contain material outside the scope of AGL activities or if they comain material already published or presented elsewhere. Only one contributed paper by the same first author will be considered for presentation; additional papers (unless invited) will be rejected automatical

Only AGU members may submit an abstract. The abstract of a nonmember must be accompanied by a membership application form (with parment) or it must be sponsore by an AGC member.

 There is a publication charge of \$40 (\$30) if prepaid) for each abstract. The publication charge is \$20 if the lost author is a student. Both invited and contributed papers are subject to the publication charge. Prepayment of the publication charge can save money. Send a check for \$30 (\$15 for students) with your abstract. The abstract must be received at AGD by February 22 to avoid an additional \$25 charge. Abstracts not prepaid will be invoiced prior to the meeting. Payments will be

 AGU will acknowledge receipt of all abstracts. Nisilication of acceptance and schedalong information will be mailed to correspanding authors in late March.

Abstracts

The abstract page is divided into two parts the abstract itself and the submittal information. Follow the instructions for both carefully. Please use a carbon ribbon to type the ma-terial, and do not exceed the maximum dimensions (11.8 cm x 18 cm) of the abstract. Abstracts that exceed the noted size limitations will be trimmed to conform.

The meeting program will be prepared by photographing the abstracts exactly as they are received. Use the model abstract to prepare the final version. Submission of an abstract for an AGU meeting is presumed to carry with it permission for AGU to reproduce the abstract in all editions of Eos and in the programs and reports relating to the meeting. It is also presumed to permit the free copying of those abstracts. Although Eos is a copyrighted journal, authors are not requested to transfer copyright. Copyright, where it exists, will be reserved by the authors

Submittal Information

Numbers refer to the items in the submittal block on the sample abstract.

Title of meeting. ldentification (only n mit an abstract; this includes invited authors): Type the identification number of one memauthor (ID number is the line consisting of four letters followed by the six digits; see member's mailing label on Eas or journals), or if no author is an AGU member, type the ID number of the member sponsor (sponsor's name must also appear on the abstract at the end of the author partion). If no ID number is given, a membership application and dues payment must accompany the abstract. Call AGU immediately at 202-462-6903 if you

need in application. 3. Corresponding address: Give complete address and phone number of author to whom all correspondence (acknowledgment and acceptance letters) should be sent. Abbreviate as much as possible.

4. Section (or theme) to which abstract is submitted (use the following letter abbreviations): A (Atmospheric Sciences): G (Geodesy): GD (Geodynamics): GP (Geomagnetism) and Paleomagnetism): U (Addentage): G ay): GD (Geodynamics); GP (Geomagnetism and Paleomagnetism); H (Hydrology); O (Ocean Sciences); P (Planetology); S (Seismology); SA (Aeronomy); SM (Magnetosipheric Physics); SC (Gosmic Rays); SS (Solar and Interplanetary Physics); T (Tectonophysics); V (Volcanology; Geochemistry, and Republics); U (Undon) Mineral Physics (subulic of 10).

V, as appropriate, noting mineral physics as

5. Type title of special session (if any) to which submittal is made. 6. Indicate your preference for a particu-

lar kind of presentation by one of the following letters: O, oral; P. poster; T, title. The chairman may assign you to one of these types of presentation in order to fit his program plan.
7. Percent of material previously present-

ed or published, and where. 8. Billing information.

(a) Complete billing address if other than the corresponding address (item 8 above).

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(c) If a student member hor, the student publication rate is applicable. Type "student rate applicable."

(d) If prepaid, enter amount enclosed. Indicate whether paper is C (contributed) or I (invited). If invited, list name of in-

Poster Sessions

A large, centrally located meeting room will be set up for poster presentations. Experience from AGU meetings and from other science entific societies has shown that a poster presentation, while more demanding of the author, can provide a superb opportunity for comprehensive discussions of research results. Some sections are organizing poster sessions on specific topics; and contributed papers on these subjects will automatically be scheduled as posters. In other sections it may be necessary to assign papers to poster ses-sions even though their authors requested oral presentation.

Presenters of poster papers are reminded that a poster exhibit requires careful prepara-tion. Figures and text should be scrubinized in detail, and authors must be prepared to discuss the contents of their papers in depth.
Under these conditions, well propared figures and conclus, legical text are essential.

Inland Seas Oceanography of Straits and Sills Oceanic Sources of Atmospheric Trace Gases Oceans Monitoring

Oceanographic Applications of EM Fields
*Pelagic Sedementation: Geology and Geo-

*Modeling Ionospheric Processes (Poster Ses-

*Upper Atmospheric Waves and Instabilities
*Middle Atmosphere Transport Processes

SPR: Cosmic Rays and Solar and

New Techniques and Applications of Geo-magnetic Effects in Cosmic Rays Studies *New Observations and Theories in Solar

*Displays of Energetic Solar Phenomena

*Recent Advances and Future Directions of

Solar Physics and Plans for Future Solar Ob-

Interplanetary Physics

(Poster Session)

Solar Observations

Geomagnetic Pulsations

er Session)

(Poster Session)

Tectonophysics

Lower Grust

Ionosphere and Plasmasphere

Plasmas (Poster Session)

Flare Particle Acceleration

servations (Poster Session)

SPR: Magnetospheric Physics

Aurora and Substorms (Poster Session)

Geomagnetic Tail and Boundary Laver (Post

Magnetospheric Currents and Electric Fields

Numerical Simulation of Space Plasmas (Post

Waves, Instabilities, and Turbulence in Space

*Role of Point Defects in the Mantle and

*Ductile Shear Zones: Mechanisms and Proc

*Observational Constraints on Mande Con-

Primarily designed as the annual review of

the research activities of the NASA Geody-

namica Program, the geodynamics sessions

will also incorporate appropriate contributed papers of a multidisciplinary nature in areas

tectonics and polar motion, tectonics, body

physics, and geopotential fields. All sessions in geodynamics will be sponsored by the Geodesy and/or Tectonophysics sections.

such as space-related aspects of geodesy, plate

vection (Cosponsored by S)

Other Themes

Geodynamics

*Gulf of Main *South Atlantic Oceanography Ocean Drilling: Past and Future *Teleconnections (Cosponsored by A)

SPR: Aeronomy

Hydrology (H) John R. Ritter, USGS, Harris-Planetology Lower Crustal Processes

Ocean Sciences (O) Robert L. Molinari, AOML/NOAA Planetology (P) Carle M. Pieters, Brown

Meeting Chairman and Union (U) H. Frank

Geodesy (G) Demos Christodoulidis, NASA/

Geodynamics (GD) Louis S. Walters, NASA

Geomagnetism and Paleomagnetism (GP) Patrick Taylor, NASA/GSFC

Atmospheric Sciences (A) Ronald Lavoic.

University Saismology (S) Emile Okal, Yale University SPR: Aeronomy (SA) Raymond G. Roble,

Program Committee

SPR: Cosmic Rays and Solar and Interplanetary Physics (SC/SS) Miriam A. Forman. SUNY, Stony Brook (SC); Bruce T. Tsurutani, Jet Propulsion Laboratory (SS)
SPR: Magnetospheric Physics (SM) Michael

Schulz, Aerospace Corp.

Tectonophysics (T) Mark Parmentier, Brown
University Volcanology, Geochemistry, and Petrology (V) Peter W. Lipman, USGS, Denver

Special Sessions

New special sessions are indicated by an as-

Atmospheric Sciences

Acid Precipitation Meteorology and Atmospheric Chemistry of the Polar Regions

Geodesy

 Trends in Geodesy *Development and Application of Global and Regional Geodetic Datums

*Interdisciplinary Research in Geodesy and Tectonophysics *Excitations of the Earth's Rotation[q]

Geomagnetism and Paleomagnetism

Rock Magnetism

*Large Scale Continental Extension Geomagnetic Methods Applied to Economic Resources *Development in High Pressure/High Temnerature Research: A Tribute to John C. Magnetic Anomaly Studies and the Structure

of the Sea Floor Magnetic Polarity Stratigraphy and Time

Irregularities in the Secular Variations and ----- Geodynamic-Implications (G)

Hydrology

Symposium on Miscible and Immiscible Transport in Groundwater

Symposium on Field Methods for Supporting Groundwater Chemical Transport Models Measurement of Groundwater Transport Pa-

*Sediment Storage in Rivers and Estuaries

El Niño: Biology and Chemistry El Niño: Physical Characteristics **Gulf Stream Dynamics** Ocean Technology

Mineral Physics

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echnique for the Preparation of Abstracts

'. R. S. T. AUTHOR (School of Oceanograph)

If one of the following fields is covered in the broadest sense, regardless of the section

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(b). P.O. 15484739 (ai. Student rate applicable

 (d). If prepild enter deposit employed. (P.O.'s requiring invoicing are not aligible for discount rate). C (Contributed)

Abitraci Deadline Pebruary 22, 1981

Chapman Conference on Collisionless Shock Waves in the Heliosphere

> February 20-24, 1984 Silverado Country Club and Resort Napa Valley, California Convenor: R. G. Stone

Invited reviews and contributed papers in the following general areas: Overview of the collisionless shock, macroscopic aspects of shocks, microscopic aspects of shocks and particle acceleration. Typical subjects to be covered include:

- · Why and where shocks form in
- the heliosphere? Shock dynamics and evolution.
- Shocks associated with solar
- activity, planetary bow shocks, corolation shocks, and shockshock interactions.
- Subcritical, supercritical, quasiparallel, and quasi-perpendicular shocks.
- Dissipation mechanisms.
- The foreshock. · Particle acceleration mechanisms.

Publication: A proposal for the publication of the invited papers as a monograph is under consideration by the AGU Monograph Board. It has also been recommended that the contributed papers be published as a separate monograph or be submitted to JGR-Space Physics through the normal AGU peer review process.

Contact: AGU Meetings, 2000 Florida Avenue, N.W., Washington, DC 20009 toll free: (800) 424-2488 D.C. area 462-6903

to which your paper is submitted, please add on your abstract, under number 5 of the subminal information, the phrase "For Mineral" Physics Session," and one of the following helds: (1) physical measurements on miner-

als, (2) calorimetry, (3) high-pressure nuneralogy. (4) defect structure studies. (5) mineral and solids equations of state, (6) quantum mechanics of solids, (7) spectral mineralogy,

Separates

To Order: The order number can be found at the end of each abstract; use all digits when ordering. Only papers with order numbers are available from AGU. Cost: \$3.50 for the first article and \$1.00 for each additional article in the same order. Payment must accompany order. Deposit accounts available.

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Exploration Geophysics

0920 Magnetic and electrical methods
PATECT OF WALL CASISON OF SURFACE FLECTRICAL SURVEY
J. Scott Holistay I Department of Physics, Geophysics
Liberatory, Daversity of Peronto, Toronto, Ort., Canada
185 1A79 G. 7. Hest
Surface electrical surveys are being used as
alternative oil exploration tools in both developed and
frontiar areas. Va have massimed the resistivity-IF
response of steel oil well casings, which are domeon in
developed oil fields. Two numerical models were
constructed; a solution of Laplace's equation in the
approach using the Gelerkin weighted realistal technique,
which simulate hollow, infinite-length cylinders and
infinite-length cylinderical shells, respectively,
anadded in a onlifem half-space. Induced-polarization
effects can be simulated in these models by iceleding a
complex, frequency-dependent surface impedance on the effects can be atwaitered in these models by the termination on the outer surface in frequency-dependent surface implement on the outer surface of the sylinder. Significant ammalies are gamerated by sipas having physically realised diametous and conductivities, important parameters governing the response are the longitudinal conductance, length and radius of the pips, and the number of pipses and their distances from the survey line. Comparison of field date with model results suggests that a significant part of the observed response may be due to well casings. Excever, more complicated models including electrical connections at the suffers and earth layering are required before securate modeling of many situations will be possible.

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Hydrology

1199 Madellasses (Fivviel Geomorphology)
CHANGE, METPORTS: A GEOMORPHOLOGICAL PRESENTITY
A. D. Abraham (Department of Geography, State
University of New York at Soffelo, Deffalo, New York,
14760).

Maivereity of New York at Buffalo, Baffalo, New York. 18160).

The study of abancel networks has been denianted after 1916 by the candon model. However, seemst work has shown (1) that atthemph the topological groparties of mail witterby conform is the candon model most of mail witterby conform is the candon model most entangle than those of large case. even small selverity which is the candon model most readmanance, and (2), that the topological and longth properties of observed nativerst are nontrailed to a large degree by the spatial requirements of subsection and the need for these substyles to fit topother in appear, by the size, simplifying the fit topology of valley pends, and by the inspire and the substyles of valley mides. The evolution of channel matworth has been cavertiated by a variety of methods, including the development of secueptual and camatation models, the mentang of spatial varie budged and experimental decimage beauty, and the substitution of space for time, The morphology of most shannel activorial targety inherited from the past or attempty influenced by inherited forms. Incannot as there is an way of every knowing the origin or somples history of such

entworks, the one of strebestic widels in their study teoms againstable, (Chapmel networks, drateage bisins, garmaphology).

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1199 General (Stochastic Differential Equation)

SMCRICAL (SITELATION OF STOCHASTIC DIFFERENTIAL

EQUATIONS IN CALCHEMY TRUETING

T.E. Univ. (Civil Implinearing, interestin of Vaterion,

Unterloo, Outario, Canada, SEL ICI)

The paper discresses appropriate integration procedure
for deriving solutions to Stochastic Differential

Equations (SEC's). Such SEC's have been suggested as

radels for the generation of stochastic impute of

rainfall and catchment electrocthom. The sucritors from

catchments. The SUC's have test developed by equaling
the Mash Casced to Include stochastic impute of

rainfall and catchment electrocthom. The sucritor

integration of the SDE's provide sample functions that

can be considered as representations of attentions.

An important result is that the integration procedure

abuild be carefully chosen to agree with the definition

of the SDE as an (rd SEE ar a Stratonovich SPE, (Sreebastic Differential Equation, It) equation,

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